

Goals of Information Systems

- Organisations guided by strategic plan, where long term goals of organisation are identified
- Following development of a strategic plan a mission statement is developed.
- Mission statement is the basis for establishing a set of common goals to help achieve the organisations aims or organisational goals.
- To achieve the goals the organisation develops a list of objectives.
- Objectives are small achievable tasks undertaken to achieve a big task.
- Non-profit organisations have different goals c/f profit organisations

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Goals of Information Systems

- Organisational goals and objectives often relate to improving the efficiency or effectiveness of operations.
- Increase efficiency:
 - Expressed in terms of cost, time and effort
 - By decreasing data-entry time by using a flatbed scanner (hardware)
 - Emailing rather than faxing to rural stores, saves time & reduces costs through less travel & less effort needed to email information
 - Increasing the accuracy of data by using improved electronic data-validation techniques (software) and/or manual data-validation techniques (procedures)

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Information Systems

- Improving effectiveness; how well information & communications technology solutions work.
- Defined in terms of its attractiveness, readability, completeness, clarity, accuracy, accessibility, timeliness, communication of the message, relevance and usability.

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Types of information systems

- Transaction processing systems
 - Processes data generated by day-to-day transactions of an organisation, eg. Billing systems
- Office automation systems
 - Routine office tasks, documents, etc.
- Management information systems
 - Used with a TPS and it manipulates data created by TPS to generate reports for managers to make decisions on

information systems

Types of information systems

- Decision-support systems
 - DSS allows users to manipulate data directly to create data models of "what if" scenarios
- Expert systems
 - Designed to analyse data and produce a recommendation or decisions
 - Uses a set of facts and rules called a knowledge base

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Problem-solving methodology relating to the analysis of ongoing information problems

- 4 stages: Analysis, Design, Development, Evaluation
- An information problem arises when an organisation's goals are not being met.
- Types of information problems: Occur as a result of:
 - Inefficient procedures
 - Information that produces inaccuracies or doesn't meet the needs of users
 - Dependence on old technology

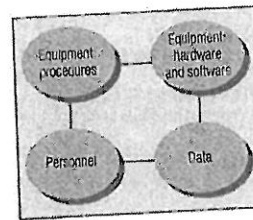
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IS Components

- Equipment - Software, 4 main types:
 - 1 Operating or System software, eg Windows 2007
 - OS configures devices, eg. Peripheral devices which rely on device drivers
 - 2 Application software: (supports computer users)
 - Off the shelf, (shrink wrapped) Vs purpose design software
 - Integrated software packages
 - 3 Utility software
 - S.ware performing particular tasks, eg. Diagnosing problems, creating backups, virus protection, eg. Nortons, etc.
 - 4 Programming software
 - Programming languages, eg. Delphi, PHP, Java, html

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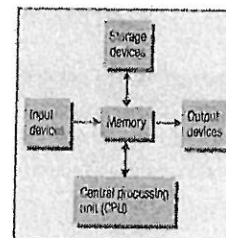
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Information System Components

- Equipment - hardware
- Hardware
 - Hardware:
 - Input & output devices
 - System unit
 - CPU
 - Microprocessor and motherboard
 - RAM & ROM
 - Ports, (connect system unit to peripheral devices)
 - Peripherals and secondary storage
 - Communication devices, nics, modems, etc.

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Hardware



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Information System Components

- Input
 - Keyboard
 - Scanner
 - Barcode reader
 - OCR
 - Touch screen
 - Camera, sensor, voice recognition

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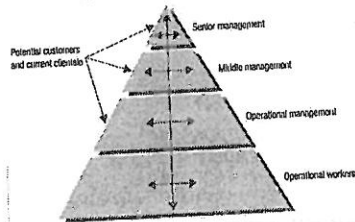
Information System Components

- Data
 - Data Vs information; data raw, unorganised; information, processed data
- Personnel
 - Users, employees, input operators, use reports, etc.
- Procedures
 - To minimise time & effort required to carry out IP tasks
 - Produce accurate, appropriate & complete info

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Information Characteristics in Organisation

- Information Flow; the way in which information flows internally between the 4 hierarchy levels within an organisation.



Structure of information

- Detailed Reports
 - Involves communication of all assembled records or information
- Summary Reports
 - Brief version of detail report using totals and averages rather than reporting individual items; used by middle & senior management
 - Gain an understanding of what is happening at operational level

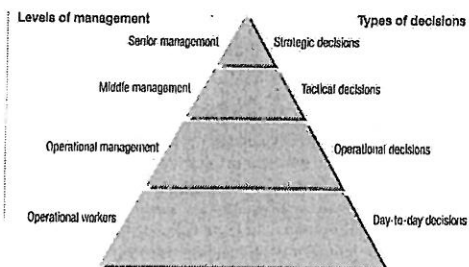
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Structure of information

- Aggregate Reports
 - Similar to detail reports but only relate to one factor or subject, eg. sales record of a particular product
- Sample Reports
 - A section of detailed information used by senior management to get an idea of overall situation
- Exception Reports
 - Identifies data that shows a variation from the set or target result; identifies situations requiring action

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Decision-making in organisations



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Decision-making in organisations

1. Senior Management, strategic, long term goals, use highly summarised information, eg. studying market trends, new products, etc, can take yrs to make
2. Middle management, tactical, problems affecting running of org; use summarised information
 - Decisions can take up to a yr to finalise, most made within weeks or months

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Decision-making in organisations

- 3 Operational management, day-day operational decisions
 - Decisions made on the spot
 - Eg. customer complaints, ordering stock
 - Operational managers uses a transaction processing system, TPS, to aid problem solving
- 4 Operational workers', day-day decisions
 - 1st point of contact with the public
 - Short-term decisions with little bearing on success of business

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Developing a solution using spreadsheet software

Using the problem solving methodology: analysis, design, development & evaluation

Analysing the problem

1 Analysing the problem

- Three parts once the problem has been defined:

- Solution requirements**

- The solution requirements are determined by establishing its functional attributes and non functional attributes.
- Function attributes entail what the solution must be able to do
- and non-functional attributes: user friendliness, reliable, portable, robust, and easy to maintain.

- Constraints or limitations of solution;**

- Cost, speed of processing, requirements of users, legal requirements, security, compatibility, level of expertise, capacity, availability of equipment

- Scope or extent of solution, in terms of what the solution will and won't do and benefits in terms of efficiency and effectiveness**

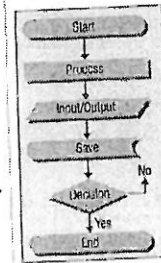
Designing the solution

- Design: planning the spreadsheet structure; relationships between entities, appearance of information, creating test plan & devising evaluation criteria.
- IPO Chart, functional elements of solution

IPO chart		
Input (data)	Processing (calculations)	Output (information)
Form groups and their allocated places	Calculate how much money each form group has raised.	A report showing how much money each form group has raised
Charities allocated to form groups	Calculate how much money has been raised for each charity	A report showing how much money has been raised for each charity
Receipts for each amount of money raised (showing date, form group and amount)	Calculate each form group's total (if amount raised is > \$1000 Gold Certificate between \$500 and \$1000, Silver Certificate between \$250 and \$500, Bronze Certificate)	A visual representation (chart) showing how much money each form group has raised

Designing the solution

- Flowcharts, graphically represent in a logical order the steps required to create a solution



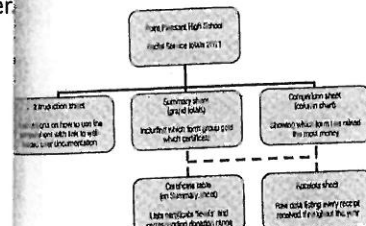
Designing the solution

- Formula list**, detailed list of the formulas to be used to achieve each bit of output identified in IPO chart.

Worksheet Summary	
Input	Formula
Form groups	A SUMIF will be used to add up all the corresponding amounts from the 'Receipts' sheet using the form group as an index.
Charities	A VLOOKUP will be used to compare the total amount each form group has raised with the certificate table on the same sheet to calculate which certificate will be awarded to each form group.
Amount raised	A HLOOKUP will add up the amounts that all form groups have raised to produce a grand total for the school.
Amount raised	The AVG function will calculate the average amount raised from all the form groups.
Current date	The TODAY function will be used to display the current date.
Form groups	A macro will be used to copy and paste the 'form' and 'total' data to the 'Comparison' sheet. Then sort the data on 'form' from largest to smallest amount.
Form groups	Conditional formatting will be applied to the 'Certificates' (location column) to apply a Brown, Silver or Gold fill, depending on the certificate awarded to the corresponding form group.

Designing the solution

- Structure Chart**, graphical representation of how the spreadsheet solution might work; showing how each of worksheets relate to each other.



Designing the solution

- **Layout diagrams**, showing basic layout of each type of worksheet, including the following:
 - The type of data to be entered into the cells
 - Indication of the contents of each cell
 - Labels
 - Any validation rules, with the error messages to be displayed
 - Formats and conventions to be followed
 - Headings, sub-headings and instructions

Designing the solution

• Layout diagrams:

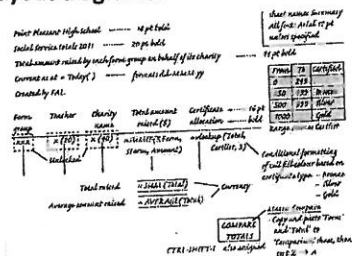


FIGURE 6-8
An example of a layout diagram for the 'Summary' worksheet in the Point Pleasant Social Services spreadsheet.

Designing the solution

- **Formats & Conventions:**
 - Numerical information
 - Numbers are naturally right aligned
 - Money values have two decimal places or none
 - Align decimal points by using a consistent number of decimal places
 - Percentages in columns appear with the percentage symbol (%) at the top of the column rather than in with the data
 - Sub-totals have a single line above the total
 - Grand totals have a single or double line below the total
 - Grand totals are in bold
 - Symbols indicating the unit of measure, such as %, \$, kg, cm, usually appear in the column heading rather than next to each value
 - Used named ranges of cells to make formulas easier to understand.

Designing the solution

- **Formats & Conventions:**
 - Financial reports
- Use a space or a comma to separate numbers greater than 999; for example 1,999
- Use italics to indicate addition or subtraction
- Sub-totals have a single line above the totals
- Include a \$ sign in column headings rather than next to each money value
- Right align dates to allow for double figures

Designing the solution

- **Formats & Conventions:**
- **Charts and graphs:**
 - must have titles identifying the name of the organisation and the purpose of the graph or chart.
 - The x-axis and the y-axis must be labelled
 - Use a key if more than one set of data is displayed on a graph or chart
 - Include author identification, and source of data and date and file name
 - Include a unit of measurement
 - Label each segment of the pie chart (starting at 12 o'clock position) from largest to smallest
 - Include absolute figures and percentages
 - Choose colours that match the information being displayed
 - Use bar charts to show the differences between values or changes over time
 - Use a pie chart to compare parts of a whole or the relationship between segments
 - Use graphs to show trends or relationships between values on each axis
 - Vary the type of lines or the thickness or colour when more than one is displayed on a line chart
 - Limit the number of items represented in a chart to 5 or 6.
 - Suitable centre a chart or graph in the middle of the page (horizontally)
 - Include an appropriate footer identifying the filename, date and page number.

Designing the solution

- **File naming conventions:**
 - The filename of a spreadsheet:
 - indicate its purpose and any time period it covers.
 - Each worksheet must also be given a short but meaningful name.

Designing the solution

- Validation:
 - Range checking, eg. students in yrs 7-12
 - eg, IF(yr_level>=7 and yr_level<=12, (Year level data is not valid) displays an error message if the inappropriate number is entered.
 - Existence checking, if code doesn't exist other formula will not calculate
 - Data Type Checking, eg. integers and not decimal numbers, or valid date is entered; also alignment of data in a column
 - Restricted data entry; drop-down menu
 - Validation alerts, use of pop-up dialog boxes to appear

Designing the solution

- Validation:

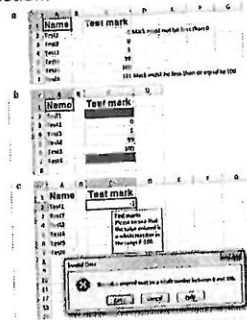


FIGURE 16
Three examples of validation errors in Excel. (a) an IF statement. (b) validation error message and (c) data validation.

Designing the solution

- Creating the Test plan
 - Validation is involved with input while testing is concerned with the solution itself and the output.
- Test plan is created after the designs for the actual solution have been created.
- Attributes or properties of a s.sheet to test:
 - 1 Functionality testing
 - The functionality of a system relates to the activities or tasks that it is designed to carry out; test all the formulas in a systematic way.
 - 2 Presentation testing
 - The most appropriate format must be chosen, e.g. chart, graph or list of results. When testing the presentation it is important to look at the colours used, the fonts, headings, titles, the balance of text and images on a page, use of consistent formats and conventions and also how easy the solution is to read.
 - 3 Usability testing
 - Can the user navigate their way through the s.sheet and use all the functions? Do hyperlinks and macros work properly? Scrolling?

Designing the solution

- Creating the Test plan
- 4 Accessibility testing
 - Does the solution open up to the right worksheet?
 - Are the font sizes easy to read?
 - Is there limited use of red and green colours on the spreadsheet for people who are colour blind
- 5 Communication of the message:
 - The information in the solution needs to be clear and precise.

Designing the solution

- Creating the Test plan; eg. of test plan for s.sheet elements

Formula/Function to test	Location	Test Data	Expected/Required Result	Why?
Function: Validation on 'Donation Amount'	Worksheet	Amount 1 2 3 999 1000 1001	3 3 Bad 1000 3 1001	Values are within the range of 2 to 1000 inclusive The message "the value entered is not between 2 and 1000" should be displayed Both values are outside the range of 2 to 1000 inclusive
Formula: =SUM(TotalR)	Worksheet	Donation Amounts 250.00 128.15 26.20 6.10	250.00 + 128.15 + 26.20 + 6.10 = 410.45	Worked out on a calculator

Evaluating the solution and output

- Evaluation considers the efficiency & effectiveness of the solution; takes place after solution implemented, between 3-6 mths.
- The evaluation is usually best undertaken by someone other than the developer
- Evaluation criteria developed in the design stage.

Evaluating the solution and output

Evaluation criteria	Source of information
All totals must be accurate, so that charities receive the correct amounts. (Effectiveness)	Look at totals in cells and compare with raw data. Check for notification of errors from form groups.
The sheets are clear and easy to read. (Effectiveness)	Interview Mr Green. Questionnaire in discussion if message in sheet layout is clearly conveyed.
Sheets are easy to edit data, but not formulas. (Efficiency)	Interview Mr Green. Perform a sample data entry. Try to edit locked cells.
The comparison data needs to be pasted and sorted easily. (Efficiency)	Interview Mr Green about macro. Observe and compare with previous system.
Receipt date is straightforward to input. Format required for data entry is obvious. (Efficiency)	Attempt to enter data into the Receipts sheet.
Error messages are meaningful. (Effectiveness)	Check error messages. They must explain the problem and how to fix it.
Mr Green is able to use the 'Completion' sheet to identify which forms raised the most money. (Effectiveness)	Interview Mr Green.
It must be easier and more accurate for Mr Green to identify which certificate should be allocated to each form. (Effectiveness)	Interview Mr Green.
User documentation meets Mr Green's needs. (Effectiveness)	Interview Mr Green.

FIGURE 9-17
Criteria to evaluate the Point Point solution.

Development stage of PSM

- Using the appropriate software to create the solution
- At end of development process use a collection of annotated screen dumps to demonstrate to the client that their needs have been met.

Development stage of PSM

- Testing the solution:
- The test plan, created during the design stage is used to conduct formal testing on each spreadsheet element, including:
 - Any calculations (formulas, referencing to other sheets, IF statements used for notification)
 - Validation
 - Lookups
 - Macros
 - Charts
 - Sorting of data

Development stage of PSM

- Testing the solution:
- User acceptance testing:
 - Test whether or not the user approves of the solution and the output and can they find the information they need,
 - Use questionnaires, and feedback

Development stage of PSM

- Testing the solution

FIGURE 9-22

Evaluating a spreadsheet solution

- Evaluation purpose: ensure that the solution meets the needs of the user as identified in the analysis stage.
- Evaluation broken down into 2 activities:
 - a. specifying a timeline of when evaluation will take place, list of data to be collected and how the data relates to the evaluation criteria.
 - b. report on the extent to which the solution meets the requirements of the user/client.
- Establish the key questions to ask main stakeholders; presented in form of eg. interview or survey; use observation & anecdotal notes of someone using the spreadsheet; feedback from a sample of users

User documentation

- Content and types of onscreen user documentation
- Functions, techniques & procedures for creating onscreen user documentation

Onscreen user documentation

- Is information to provide guidance to users, and is designed to be viewed on the screen of a computer or other electronic device.
- Onscreen user documentation performs these functions:
 - User relies on it for instructions on accessing & using features of new programs or devices
 - User in a workplace refers to in-house onscreen documentation on company procedures, etc
 - If a problem occurs whilst using a product a user may refer to a help file.

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Types of onscreen user documentation

1. User guides and instruction manuals
 - Standard guides provided on CD or DVD
 - Purpose is to inform and instruct user re characteristics, capabilities etc of hardware or software
 - Popular formats include PDF and hypertext; both support text & graphics, small in file size and accessed on various platforms
 - Third party user guides, published in addition to manufacturer's own user guide.

Types of onscreen user documentation

- 2 Quick start guides
 - For 1st time or inexperienced users
 - Brief, simple instructions
 - Usually brief text or hypertext instructions with screen shots
 - Animation, video or sound files may also be included
 - Usually a link to further information or tutorials
- 3 In-house user documentation
 - User guides & instruction manuals enable employees or clients to use an information system
 - May include in-house protocols
 - May be PDF or hypertext
- 4 Read me files
 - Provided with hardware and software products
 - Contain important information such as system requirements, troubleshooting strategies, details on how to access product updates
 - Late breaking news about a product
 - Traditionally been text files; now often hypertext
 - Usually read onscreen

Types of onscreen user documentation

- 5 Tutorials
 - Step-by-step instructions for using features and functions of software or hardware device
 - Include text and graphics as screen shots in PDF or hypertext
 - Can be series of multimedia files
 - Accessed from a menu choice or icon or provided on CD or DVD or downloadable
 - Third party provide them as well as free tutorial files
- 6 Help files
 - Searchable information about the features and functions of a software application or device
 - Searchable by content or an alphabetical index
 - Don't usually contain detailed technical information
 - Content-sensitive help, responds to the current content that the user is accessing; assists user with common tasks
 - Utility program, eg. windows help viewer enables the viewing of help files

Types of onscreen user documentation

- 7 Web support
 - Directly available from a manufacturer's website; include FAQs, knowledge base, troubleshooting and how to upgrade the product, including patches
 - Community or forum-based websites also support some hardware & software products.
 - Blogs also offer a form of onscreen support
- 8 Tool tips & hint boxes
 - Tool tips, holding the cursor over an icon
 - Hint box, clicking on an icon may open a hint box; a form of content-sensitive help.

Onscreen User Documentation

Efficient & effective user interfaces
and information architecture

Design elements to consider

1. Proportion

- Refers to the visual hierarchy of a page on the screen
- Most important pieces of information have visual prominence on the page
- Proportions, relative sizing of fonts & graphics affect visual hierarchy of a screen
- Positioning of page elements including whitespace around objects, formatting of fonts

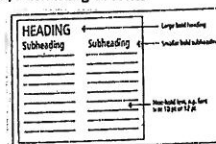


FIGURE 1-9
Visual hierarchy of a page. Main heading is large, bold and at the top of the page. Subheading is bolded, smaller and is not bolded. The user's attention is quickly drawn to the heading and subheadings.

Design elements to consider

2. Orientation

- Refers to direction and aspect of elements of an onscreen page
- Eg. direction that a logo is to face, where navigation frames should be and alignment of text
- Layout needs to take into account various sizes and shapes that the information may be presented in.

3. Clarity and consistency

- Clarity refers to how clearly the information on a screen is presented
- Choice of font styles and sizes contribute to clarity as well as resolution of graphics
- Consistency refers to the use of similar, repeated or predictable features on a screen;
- Eg. similar layout for different pages;
- Elements that can be used consistently include logos, headers and footers, font styles, navigation icons, etc.

Design elements to consider

4. Colour and contrast

- Use conventions for onscreen colours including;
- Black text on a white background
- Avoid using red and green together, (colourblind people)
- Limit variety of different colours on the screen
- Light or pastel shades are best choices for backgrounds
- Use whitespace to assist in balance of text and graphics on a page to support contrast
- Avoid yellow or light colours for text on a white background

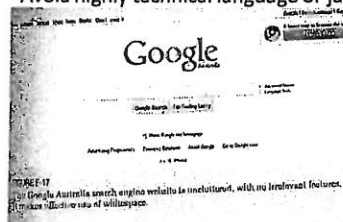
Characteristics of onscreen solutions: efficient and effective user interfaces

- User interface is the point at which a user interacts with an information system.
- In addition to the design elements already considered high quality user interfaces need to consider the following:
 - Usability and accessibility
 - User interacts with interface intuitively
 - Screen shouldn't be unnecessarily elaborate or decorative
 - Long or wide screens requiring scrolling should be avoided
 - Font selection, use serif fonts for body, sans serif for headings
 - Accessibility, a user should be able to find what they want on the screen immediately
 - Use conventional navigation symbols, eg. question mark for help; house symbol for a home icon, arrows for backwards and forwards
 - Designers need to keep in mind their target audience, eg. aware of vision impaired or other disabilities
 - Use of content-sensitive help
 - Built in redundancies, or alternatives into an onscreen product.

Efficient and effective user interfaces

2. Appropriateness and relevance

- Product must have appropriate information that is relevant
- Avoid highly technical language or jargon



**Characteristics of effective
information architecture**

- Information architecture of an onscreen solution refers to the way that the information is structured and the ways it can be navigated by a user.
- Information architecture design may include multiple screens linked by a well-planned series of hyperlinks to create maximum ease of use.